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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/918,117
Applicant(s): Akira TSUBOUCHI, Kiyoshi OKUBO and Yasushi
WATANABE
For: HOLLOW RACK SHAFT
Confirmation No.: 2600
Customer No.: 24731
Docket No.: 18733/00060
Filed: July 30, 2001
Group Art Unit: 3682
Examiner: Bradley J. Van Pelt

MAIL STOP AF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

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April 14, 2005

Date of Deposit

Douglas A. Sorensen

Name of Applicant, Assignee, or Registered Representative

Signature

April 14, 2005

Date of Signature

RESPONSE UNDER 37 C.F.R. § 1.116

This Response is filed in response to the Office Action dated February 22, 2005, which provides for a response period ending May 22, 2005.

Claim 13 is pending in the application; the status of the claim is as follows:

Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Publication No. 11-278287 to Oya ("Oya") in view of U.S. Patent No. 6,499,753 B2 to Irvine et al ("Irvine").

35 U.S.C. § 103(a) Rejection

The rejection of claim 13 under 35 U.S.C. § 103(a), as being unpatentable over Oya in view of Irvine, is respectfully traversed based on the following.

Oya shows the formation of rack teeth 11 in a tubular body. A metal sheet 1 is bent in a U-shaped body 10 and then the rack teeth 11 are formed at the apex of the U shape (Figures 3, 6 and 7). The concave side of the piece is then placed in a mold 32 and a punch 31 is pressed onto the open end of the U to press the sidewalls 9 into a semicircle, thus completing the tube (Figure 5).

In Irvine, a solid rack shaft 14 is formed with gear teeth 88 that are wider than the diameter of the shaft. "The rack and pinion steering system 10 ... has a wider gear rack teeth 88 relative to the rack diameter." (column 4, lines 20-22) Of importance, the bearing surface 76 has a constant radius that is equal to that of the cylindrical end 66 of the shaft that does not bear teeth. With the exception of the rack teeth, the entire rack shaft 14 has a uniform radius. Rack gear teeth 88 are formed by forging or machining. (col. 4, lines 12-19)

In contrast to the cited references, claim 13 includes:

A hollow rack shaft which is formed cylindrically by bending a straight plate having wider and narrower width parts so that two sides of the plate are joined, ...:

said rack shaft includes a first area corresponding to said wider width part and at least one second area corresponding to said narrower width part;

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wherein, in said first area, the row of rack teeth and a semi-cylindrical part on a reverse side of the row of rack teeth are formed; and
in said second area, a respective complete cylindrical part coaxial with said semi-cylindrical part is formed and has an outer diameter smaller than an outer diameter of the semi-cylindrical part in said first area.

Applicants maintain that Irvine shows wider rack teeth 88 formed on a cylinder 76 having a radius 72 equal to the radius of cylindrical portion 66. However, even conceding this point only for the sake of argument, the cited references still do not support a *prima facie* case for obviousness. One skilled in the art would not look to the teaching of Irvine to modify Oya because one skilled in the art would not have a reasonable expectation that fabrication techniques shown for the solid rack shaft of Irvine could be successfully used in the fabrication of the hollow rack shaft of Oya. MPEP §2142.02. The entire purpose of the Oya application is to handle the difficult problem of forming rack teeth on a hollow rack shaft (Technical Problem Section). Irvine stamps or machines the rack teeth into a solid shaft. Stamping the hollow shaft of Oya would simply collapse the shaft as discussed in paragraph [0004] of Oya. Machining would also thin the tube wall, which Oya states is undesirable in paragraph [0004] and paragraph [0019]. Neither process as applied to a hollow rack shaft would expand the diameter of the shaft. Thus, the Oya reference teaches that the techniques taught in Irvine for forming the rack teeth are undesirable for use with a hollow rack shaft. Thus, one skilled in the art would not have looked to Irvine to modify the teaching of Oya.

In addition, there is no suggestion in either reference of "a straight plate having wider and narrower width parts," much less a rack shaft formed from such a plate. Although the quoted phrase is in the preamble, it must be considered. "Any terminology in the preamble that limits the structure of the claimed invention must be treated as a claim limitation." MPEP §2111.02. Furthermore, there is no suggestion in the references that a plate having two widths could successfully be formed into a rack shaft using the technique of Oya.

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For the above mentioned reasons, the Oya and Irvine references cannot be effectively combined and, even if combined, do not show or suggest every limitation of claim 13. Therefore, the cited references do not support a *prima facie* case for obviousness and claim 13 is patentably distinct from the cited references.

Accordingly, it is respectfully requested that the rejection of claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Oya in view of Irvine, be reconsidered and withdrawn.

CONCLUSION

Wherefore, in view of the foregoing remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.


If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee,

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Respectfully submitted,

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